PATENT ABSTRACTS OF JAPAN

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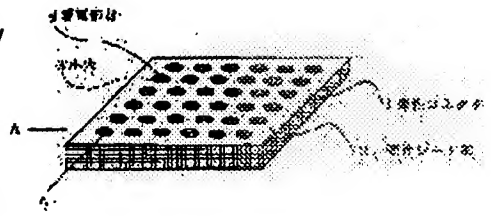
(71)Applicant : CITIZEN ELECTRONICS CO LTD
(72)Inventor : HORIUCHI MEGUMI
TSUCHIYA HIRONORI

(54) ELASTIC CONNECTOR AND MANUFACTURING METHOD THEREFOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an elastic connector and its manufacturing method, having a low price since machining is easy and the yield is satisfactory, capable of easily realizing fine dimensional accuracy, satisfactory in adhesion between an elastic sheet member and conductive members and capable of providing a stable connecting condition, even under a low pressurized condition.
SOLUTION: In the elastic connector, the conductive members are arranged in interiors of a plurality of pin holes formed in the thickness direction of the elastic sheet member, and an elastic sheet member applied with foaming treatment is used as the sheet member. Also, the elastic sheet member is a resin sheet member, mixed with microbubbles or microballoons. In the manufacturing method of the elastic connector, pin hole machining, arranging work of the conductive members, or the like are carried out in a state with the foamed elastic sheet member being enlarged by expansion in the planar directions.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the elastic connector from which the connection conditions stable also under the still more detailed pressurizing condition whose adhesion of an elastic sheet member and a conductive member is at best still lower are acquired about an elastic connector and a manufacturing method for the same.
[0002]
[Description of the Prior Art]In connection between the circuit board in electronic equipment, and a liquid crystal display etc., the welded type elastic connector by an elastic sheet member is used. The manufacturing method of the elastic connector of form which the thing of forms more nearly various than before is manufactured as a this pressure welding type elastic connector, for example, laid the metal thin wire underground into the elastic sheet member at JP,59-203385,A is indicated.
The manufacturing method of the elastic connector of the form which carried out distributed mixing of the conductive magnetic particulate into the elastic sheet member is indicated by JP,10-134868,A, Alignment arrangement of the conductive thin wire is carried out in a fixed pitch on the surface of an elastic sheet member, and the manufacturing method of the elastic connector of the form which twisted this elastic sheet member around the insulating elastic member in the shape of a U character is indicated by JP,11-162544,A.

[0003]However, there is a problem of neither accuracy of form nor the yield being bad, sufficient connection characteristics not being obtained, or a use being limited in each above-mentioned conventional example, and these people have proposed a new elastic connector and a manufacturing method for the same in the patent application No. 007094 [2001 to] as what solves it.
[0004]With reference to drawing 3 - drawing 6, the elastic connector previously proposed by the patent application No. 007094 [2001 to] is explained. Drawing 3 is a top view of the elastic connector of point **, and the elastic connector 11 became an inside of two or more small holes 13 formed in the thickness direction of the elastic sheet members 12, such as silicone rubber, with the composition that the conductive member 14 was allocated, and is an elastic connector which has conductivity only in a thickness direction. and -- as an elastic connector, an outside is the small size whose thickness is 0.5 mm - about 2 mm in 50 mm - about 100 mm -- a conductor -- the size of a part -- 0.05 mm - 0.3 mm, and a conductor -- the pitch

between parts is aimed at the elastic connector of small size which has 0.1 mm - 0.5 mm.

[0005]Drawing 4 is a top view showing the state where two or more small holes 13 were formed, and uses silicone rubber for the elastic sheet member 12 as the elastic sheet member 12, and this silicone rubber has one 2 to 8 times the pace of expansion of this to a plane direction. In 60 mm and thickness, the outside has formed two or more small holes 13 of the diameter of 0.1 mm in the 1-mm elastic sheet member 12 in the pitch of 0.2 mm. And by allocating the conductive member 14 in two or more of these small holes 13 of all, the elastic connector 11 shown in drawing 3 is completed.

[0006]Drawing 5 is a top view of the elastic sheet member 12 in the work process of the elastic connector 11, and the elastic sheet member 12 is in the state where it was extended in the direction shown by the arrow A, and the outside was extended, The drilling process of said small hole 13 and allocation processing of the conductive member 14 can be performed, and the elastic connector 11 of the small size shown in drawing 3 can be completed by canceling the enlargement of said direction of arrow A after the end of all the work processes.

[0007]Drawing 6 is a sectional view of the portion of the conductive member 14 allocated by the small hole 13 in the elastic connector 11 shown in drawing 3, and its inside, is formed in the wall of the small hole 13 of plating, vacuum deposition, print processes, etc., and uses the electric conduction coat 14a as a conductive member.

[0008]

[Problem(s) to be Solved by the Invention]Since the elastic connector proposed by said patent application No. 007094 [2001 to] is easy to process and its yield is good, it is a low price, and it can provide the elastic connector which realized detailed dimensional accuracy easily. However, since the connected state as an elastic connector is decided by construction material (characteristics, such as an elastic modulus) of an elastic sheet member, For example, in the usage which the reduction of area to load can seldom be enlarged, but can pressurize it enough in the case where silicon is used, it was good, but in the usage which cannot pressurize enough, there was a case where a connected state became unstable.

[0009]Generally a conductive member like a metallized layer or conductive paste had adhesive strength difficult to get to the elastic sheet member, and there was a danger that the conductive member which was allocated in the small hole of an elastic sheet member for this reason would exfoliate and fall out.

[0010]Then, since this invention is easy to process and its yield is good, while being a low price and being able to realize detailed dimensional accuracy easily, It aims at providing an elastic connector from which the connection conditions stable also under the pressurizing condition whose adhesion of an elastic sheet member and a conductive member is at best still lower are acquired, and a manufacturing method for the same.

[0011]

[Means for Solving the Problem]In order to solve an aforementioned problem, it was characterized by this invention using an elastic sheet member which performed firing processing as a sheet member in an elastic connector which allocated a conductive member in an inside of two or more small holes formed in a thickness direction of an elastic sheet member.

[0012]It was characterized by said elastic sheet member being a resin sheet member which mixed a microbubble or a micro balloon.

[0013]In an elastic connector which allocated a conductive member in an inside of two or more small holes by which a manufacturing method of this invention was formed in a thickness direction of an elastic sheet member being carried out, It was characterized by a manufacturing method of an elastic connector which allocates a conductive member in an inside of said small hole extended by extending and extending an elastic sheet member which has said two or more small holes, and by which foaming treatment was carried out to a plane direction.

[0014]

[Embodiment of the Invention]First, the elastic connector of this invention is explained with reference to drawing 1 - drawing 2. Drawing 1 is a top view of the elastic connector in this invention, and the elastic connector 1 became an inside of two or more small holes 3 formed in the thickness direction of the elastic sheet members 2, such as silicone rubber, with the composition that the conductive member 4 was allocated, and is an elastic connector which has conductivity only in a thickness direction. And as an elastic connector, an outside is the small size whose thickness is 0.5 mm - about 2 mm in 50 mm - about 100 mm, a conductor -- the size of a part -- 0.05 mm - 0.3 mm, and a conductor -- the small thing in which the pitch between parts has 0.1 mm - 0.5 mm is generally made into **, and is aimed at the elastic connector of this small size also in this invention.

[0015]Drawing 2 is an A-A sectional view of the elastic connector 1 shown in drawing 1, and shows the section of the conductive member 4 allocated inside said small hole 3. Like the graphic display, foaming treatment is performed to the elastic sheet member 2, and many detailed vents 2a are formed in the inside of the elastic sheet member 2, and crevice 2b of a large number formed by cutting said vent 2a is provided in the surface of the elastic sheet member. And by allocating the conductive member 4 in two or more of these small holes 3 of all, the elastic connector 1 shown in drawing 1 is completed.

[0016]The place where the elastic connector 1 in this invention differs [patent application / No. 007094 / 2001 to / of point **] from the elastic connector 11 of a proposal, It is that foaming treatment of the elastic sheet member 2 is carried out, and while the wall and the circumference of said small hole 3 have uneven shape with said crevice 2b for this reason, that surface area is large. it is allocated in the small hole 3 by this, an anchor effect generates the conductive member 4 by being laid also under the inside of said crevice 2b, and stable allocation conditions are acquired -- things can be carried out.

[0017]The elastic sheet member 2 becomes possible [obtaining the big change to load by existence of many detailed vents 2a], and offer of the elastic connector from which the connection conditions stable also under the low pressurizing condition are acquired of it is attained.

[0018]Next, the foaming treatment of the elastic sheet member 2 in this invention is explained. It is necessary to make small enough size of the vent 2a by which foaming treatment was carried out first compared with the diameter size of said small hole 3, or the pitch sizes between the conductive members 4. There are a method of making foam, such as carbon dioxide and nitrogen gas, mixing and foaming to the elastic sheet members 2, such as silicon resin, as the method of foaming treatment, and a method of making add-in material, such as a microbubble (textile-glass-yarn particles) or a micro balloon (resin system particles), mix and foam to the elastic sheet member 2.

[0019]Drawing 7 is a sectional view of a microbubble (textile-glass-yarn particles) and a micro balloon (resin system particles) which is the add-in material for foaming in this invention, That in which what is constituted

as the particles 22 which contain the air 21 in the inside of the coat 20, and constituted this coat 20 from glass constituted the microbubble and the coat 20 from resin is a micro balloon.

[0020]The particle diameter of this particle 20 is what is tens of microns and has realized the big elastic sheet member of modification from several microns by mixing this particle 20 in silicon resin etc. in this invention, By choosing the particle diameter of this particle 20 to mix, it becomes possible to adjust the reduction of area of an elastic sheet member.

[0021]Drawing 8 is a characteristic curve which shows the load-displacement characteristic of the elastic connector 1 in this invention, a vertical axis is load (g) and a horizontal axis is displacement (mm). In drawing 8, the elastic connector for which the curve I used the usual elastic sheet member, and the curve II are the elastic connectors which used the foaming elastic sheet member. As shown in a figure, in fixed load (for example, 200g), displacement of the curve II shows 1.0 (mm) and a twice [about] as many change as this to displacement of the curve I being 0.5 (mm). Since the quantity of the displacement to this load can be arbitrarily adjusted with the method of foaming treatment like the above-mentioned, it can adjust foaming conditions in consideration of the service condition of an elastic connector.

[0022]As a manufacturing method of the elastic connector 1 in this invention, Like the manufacturing method of the elastic connector proposed by the patent application No. 007094 [2001 to], by extending and processing the elastic sheet member 2, it becomes possible to perform a drilling process and allocation processing of a conductive member with a bigger size than a dressed size, and becomes possible in facilitating of processing, and improvement in dimensional accuracy. It may be attached to the conductive member 4 allocated inside the small hole 3, or an electric conduction coat may be formed with plating, vacuum deposition, etc., and conductive paste may be laid underground by an injection method, print processes, etc.

[0023]

[Effect of the Invention]The elastic connector from which the connection conditions which were a low price since processing was easy and the yield was good according to this invention like the above, and were stabilized also under the pressurizing condition whose adhesion of an elastic sheet member and a conductive member is at best still lower while being able to realize detailed dimensional accuracy easily are acquired is realizable. The elastic connector doubled with the pressurizing condition can be provided by furthermore adjusting foaming conditions.

[0024]By extending and processing an elastic sheet member, it becomes possible to perform a drilling process and allocation processing of a conductive member with a bigger size than a dressed size, and becomes possible in facilitating of processing, and improvement in dimensional accuracy.

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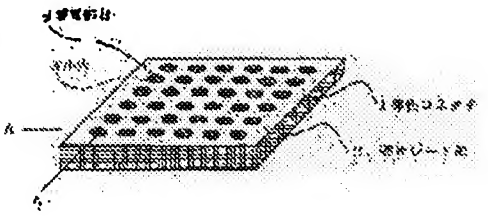

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